

VALUE ENGINEERING STUDY

Project # APD00-0056-02(029) PI No. 122900-

**SR 515/US 76 from CS 2898/Young Harris St
to CR 153/Timberline Dr
Union/Towns County, Georgia**

Prepared for:



**One Georgia Center
600 West Peachtree NW
Atlanta, Georgia 30308**

13 August 2015



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13 August 2015

Mr. Matt Sanders, AVS
Value Engineering Specialist
GDOT - Engineering Services
One Georgia Center - 5th Floor
600 W. Peachtree Street NW
Atlanta, GA 30308

Re: V.E. Workshop – SR 515/US 76 from CS 2898/Young Harris St to CR 153/Timberline Dr,
Union/Towns County, GA
Project #: APD00-0056-02(029) - PI#: 122900-

Dear Mr. Sanders:

U.S. Cost, Inc. is pleased to submit two (2) hard copies and one (1) CD of the Value Engineering Study Report on the above referenced project. We appreciate the assistance and participation of the GDOT management personnel as well as the design team.

This Workshop resulted in the development of seven (7) value-enhancing proposals. We hope that incorporation of some of these value improvement alternatives provided herein results in an enhanced project in relation to cost, constructability and long-term performance of the project features.

Please feel free to contact me to discuss any information within this report. We look forward to the next opportunity to be of service to the Georgia Department of Transportation.

Sincerely,

U.S. COST INCORPORATED



Tom Orr, P.E., CVS
V.E. Team Leader, acting on behalf of U.S. Cost

CC: L. Myers, GDOT

VALUE ENGINEERING TEAM STUDY

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VALUE ENGINEERING STUDY

PROJECT DESCRIPTION

This SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive project involves widening and reconstruction of SR 515/US 76 in Union and Towns Counties in Georgia. The project will widen and reconstruct the existing two-lane with intermittent passing lanes roadway to primarily a 4-lane divided highway.

The proposed project involves work along an 8.5 mile section of SR 515/US 76 beginning east of Blairsville from Young Harris Street/CS 2898 to just east of Timberline Drive/CR 153 in Young Harris. The new roadway consists primarily of a four-lane divided roadway (two lanes in each direction) with 32' median, and 6.5' outside shoulders to accommodate bicycles. The project also includes a bypass around the City of Young Harris that consists of a two-lane roadway with roundabouts at each end. The right-of-way varies from 130' to 250' along the SR 515/US 76 mainline and a right-of-way along the Young Harris bypass of between 80' and 100'.

Project components include:

- New 4-lane (12' travel lanes) divided roadway with 32' wide median
- Outside shoulders of 6.5' width to accommodate bicycles
- New 2-lane Young Harris bypass
- Two roundabouts
- One (1) bridge location, at Brasstown Creek

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Introduction

U.S. Cost conducted the Value Engineering Team Study on SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive. The V.E. study was conducted for three and ½ days, 10 - 13 August 2015, at the Georgia Department of Transportation 5th floor Conference Room in Atlanta, GA. The study team was furnished with a concept report and preliminary construction plans for use in conducting the V.E. workshop. The following individuals were members of the V.E. team:

Name	Firm	Discipline
Tom Orr, P.E., CVS	MBP (for U.S. Cost, Inc.)	V.E. Team Leader (VETL)
Gary Newton, P.E.	Kimley-Horn	Roadway Engineer
George Manning, P.E.	Michael Baker Corporation	Bridge/Structures
Jerry Brooks, P.E.	Kimley-Horn	Construction

Value Engineering Study Process

The Value Engineering Study followed the Value Engineering Job Plan as certified by SAVE International as follows:

- Information Phase (Monday)
- Function Analysis Phase (Monday)
- Creative Phase (Monday)
- Evaluation Phase (Monday)
- Development Phase (Tuesday - Wednesday)
- Presentation Phase (Thursday AM)

Information Phase

The V.E. team was first briefed on the project design by Georgia DOT project management and HNTB design team representatives in a Design Presentation the morning of the first day of the V.E. Study. The briefing included a review of the design requirements and rationale for the selection and arrangement of the major project features. Discussions regarding alternatives considered, adjacent properties/facilities, and project criteria and constraints were included in the design presentation.

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Project Design Criteria

During the meeting, project design criteria were identified. The following listing identifies the design criteria with which the project must comply:

AASHTO Design Policies
FHWA Design Policies
Environmental Restrictions

Project Constraints

During the presentation by the design team on the project overview, the V.E. Team was alerted to the stakeholder's constraints on this project which include:

- PAR and AOE agreements
- Use of Roundabouts
- Avoid or minimize impacts to cemeteries, historical properties and archaeological sites along corridor

Function Analysis

As a basic part of the V.E. process, the team conducted a Function Analysis session on the SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive project to identify the needs and goals of the project and facilitate the creative idea session, by addressing functions as opposed to the specific design elements.

The Basic Function of the project is to “*Reduce Congestion*”. A detailed project function analysis of the characteristics of the project and the project features is presented in the Appendix.

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Risk Analysis

The group identified the following project risk elements, which may impact the SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive project. This exercise served as a catalyst for the Creative Phase of the study when several ideas were suggested which would mitigate these project risks.

Risk Elements/Concerns

- Stream Impacts
- Cemeteries, Historical and Archaeological Impacts
- Significant Property Impacts
- Wetlands Impacts
- Forestry Service Property Impacts
- Property Owner Impacts
- Project Stakeholder Support
- Unknown Quality of Rock
- Impact to Travelling Public
- Impacts on Businesses
- Impacts to Utilities
- Impacts to Bat Habitat
- Seasonal Work Restrictions due to Bat Habitat

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Creative Phase

The Creative Phase of the V.E. study was initiated the afternoon of the first day of the study. A total of sixteen (16) creative ideas were generated for further investigation by the team. The creative ideas focused on areas of the project which the V.E. Team felt had the most opportunity for value improvement, including:

- Limited realignment of roadway closer to existing
- Reducing right-of-way acquisition required
- Locating new alignment as close as possible to existing
- Shifting vertical alignment to reduce size of retaining walls
- Eliminating guardrails and creating traversable slopes
- Reducing width of new corridor and reducing impacts

A listing of all creative ideas on this project is included in the Appendix.

Alternative Idea Evaluation Criteria

The session participants identified the characteristics for evaluating the V.E. ideas for which alternatives would be the most acceptable for incorporation in the project. The highest ranked ideas would satisfy several of these criteria. The evaluation criteria for V.E. ideas are as follows:

V.E. Idea Evaluation Criteria

Improves Operations
Reduces Construction Time
Acceptability
Reduces Impacts

- Property
- Business
- Environmental

Reduces Costs
Enhances Constructability
Reduces Maintenance

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Evaluation Phase

The ideas generated during the Creative Phase were reviewed and evaluated by the V.E. session participants during an Analysis/Judgment Phase session. The intent of the meeting was to allow the participants an opportunity to discuss and evaluate the ideas. A few of the V.E. ideas were dropped at that time as being conceptually unacceptable. The ranking session consisted of the V.E. Team members assigning a ranking for each idea. The Acceptability ranking was based on how each idea improves the value of the project when considered against the evaluation criteria listed previously. All ideas were given a designation of 1-5 on acceptability, with a 5 being those ideas that brought the most added value to the project. This is a time management tool to identify those proposals that have the greatest potential. Approximately seven (7) out of the original sixteen (16) creative ideas were deemed promising for further investigation and analysis by the V.E. Team.

The time management ranking system used by the V.E. Team is as follows:

VALUE IMPROVEMENT RANKING OF IDEA

- 5 points - Excellent Idea
- 4 points – Very Good Idea
- 3 points - Good Idea
- 2 points - Fair Idea
- 1 point - Do Not Develop

VALUE ENGINEERING STUDY

KEY INFORMATION/NOTES

Development Phase

The specific proposals found in the body of this report represent the positive results of investigations by the V.E. Team on the SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive project. Each proposal represents a quality enhancing or cost saving alternative, which is documented by words, drawings, estimates and calculations. The proposal format presents the idea, describes the original design element proposed for change and the proposed change, lists the perceived advantages and disadvantages of the proposed change and supports the idea with a detailed cost estimate for the original and proposed design. Where necessary for clarity, the proposal also includes thumbnail design drawings and supporting engineering calculations.

Presentation Phase

A presentation to the GDOT and design team representatives was conducted on 13 August 2015 at 9 AM.

Basis of V.E. Cost Savings

The cost information for proposals in this report are based on the cost data prepared by the design team, GDOT Item Mean Summary (with cost data for prior 3 years), V.E. Team member experience, and discussions with vendors/Contractors. Overhead and profit are included in the project cost estimate and the GDOT Item Mean. Therefore, no additional markups are applied. The savings presented in the proposals is a general order of magnitude (estimate of the potential savings) if the idea were to be accepted. These figures are solely intended to identify the most attractive design solution, and are not prepared to represent a net deduction to the overall project budget. The costs are in 2015 dollars.

Evaluation of Alternatives

When reviewing the value engineering proposals, consider each part of an alternative on its own merit. There may be a tendency to disregard an entire alternative because of a concern about one aspect of it. We encourage partial acceptance of ideas; thus, each aspect of an alternative should be considered for incorporation into the design, even if the entire alternative is not implemented. Variations of these proposed alternatives are encouraged.

VALUE ENGINEERING STUDY

VALUE ENGINEERING RESULTS

The V.E. Team generated 16 creative ideas and developed 7 proposals for consideration by GDOT. Brief outlines of the V.E. proposals are as follows:

Proposal Highlights

R-1.0 – Establish a Consistent Width for Right of Way of 150’ and Utilize Easement Beyond the Right of Way. The current project concept report states proposed right of way to be 180’ to 250’ for the 4-lane divided section. The proposed right of way includes all of the construction limits and with no easements proposed. The preliminary right of way estimate indicates that there is a permanent easement factor of 50% of the fee simple estimate. Some right of way areas, such as Sta. 138+00, Sta. 259+00, and Sta. 345+00, are as much as 400’ and the right of way is shown 40’ to 50’ beyond the limits of construction. In R-1.0, it is proposed to establish a consistent typical right of way width to include the roadway and the required clear zone. For the basic 4-lane divided roadway the edge of pavement is 40’ from the centerline and the maximum required clear zone is 30’ therefore the typical right of way width could be 140’. Common practice is to establish a more even number and therefore a basic 150’ right of way width is proposed for this project. Additional right of way would be required at intersections with right turn lanes. Easements would be established beyond the right of way to build the slopes. This will allow the property owners the opportunity to use the property acquired as easement after construction is complete. This alternative results in reduced right of way acquisitions, and provides a project cost savings of \$1,165,000.

R-2.0 – For New Pavement Sections on 4-Lane Divided Segments, Use 11’ Inside Lane Widths in lieu of 12’ Lane Widths. In the current design, all lane widths on new pavement sections are shown as having 12’ widths. In R-2.0, it is proposed to construct the inside lanes on the 4-lane divided sections of roadway with an inside lane width of 11’ in lieu of 12’. The 4-lane divided section of the project extends from Sta 116+00 to 420+38. This alternative will provide an acceptable design for divided roadways and provides a project cost savings of \$357,000.

R-3.0 – Change the Median From a 32’ Depressed Grassed to a GDOT Standard 24’ Raised Grassed Median for the 4-Lane Divided Section. In the current design, the 4-lane divided section from Sta. 116+00 to Sta. 426+00 has a 32’ depressed grassed median. In R-3.0, it is proposed to use a standard GDOT 24’ raised grassed median for the 4-lane divided section from Sta. 116+00 to Sta. 426+00. This alternative greatly reduces the project footprint, reduces disturbances and impacts to property owners and provides a project cost savings of \$1,075,000.

R-5.0 – Reduce the Width of Outside Paved Shoulder from 6.5’ to 4’. In the current design, the paved portion of the outside shoulder is 6.5’. In R-5.0, it is proposed to reduce the paved width of the outside shoulder from 6.5’ to 4’. This alternative meets AASHTO standards while providing a project cost in lieu of \$456,000.

VALUE ENGINEERING STUDY

VALUE ENGINEERING RESULTS

R-9.0 – Shift Horizontal Alignment Closer to Existing from Sta 130+00 to Sta 170+00. From Sta 130+00 to Sta 170+00, the current design significantly shifts the proposed alignment away from the existing roadway. The shift results in large cut sections and tall walls. In R-9.0, it is proposed to shift the alignment to better align the proposed roadway with the existing roadway. The proposed alignment includes curves with radii of 1100' and 1250', which are adequate for the 55 mph speed. The proposed alignment shift will reduce wall height and excavation costs, reduce property impacts and the costs associated with right-of-way acquisition and relocation, and result in a project cost savings of \$2,394,000.

R10.0 – Shift Horizontal Alignment Closer to Existing from Sta 235+00 to Sta 250+00. From Sta 235+00 to Sta 250+00, the current design significantly shifts the proposed alignment away from the existing roadway. The shift results in large cut sections and property impacts. In R-10.0, it is proposed to shift the alignment to better align the proposed roadway with the existing roadway. The proposed alignment includes curves with radii of 1100' and 3000', which are adequate for the 55 mph speed. The proposed alignment shift will reduce earthwork cost, reduce commercial right of way acquisition, and result in a project cost savings of \$278,000.

R-12.0 – Eliminate Guardrails and Utilize Traversable Slopes at Specific Locations. The original design uses guardrails with 2:1 slopes in lieu of traversable slopes. In R-12.0, it is proposed to eliminate or reduce the guardrails at 6 locations and use 4:1 traversable slopes. At three locations, TP1 Anchors will also be eliminated. This alternative eliminates unnecessary features, eliminates ongoing maintenance on these features, and provides a projects cost savings of \$17,000.

SUMMARY OF VALUE ENGINEERING PROPOSALS

Project # APD00-0056-02(029) PI No. 122900-
SR 515/US 76 from CS 2898/Young Harris St to CR 153/Timberline Dr
UNION/TOWNS COUNTY, GEORGIA

IDEA NO.	PROPOSAL DESCRIPTION	CONSTRUCTION SAVINGS	RELATED PROPOSALS
	ROADWAY (R)		
1.0	Establish a consistent width for right of way of 150' and utilize easement beyond the right of way to allow property owners the opportunity to use their land after construction	1,165,000	
2.0	For New Pavement Sections on 4-Lane Divided Segments, Use 11' Inside Lane Widths in lieu of 12'	357,000	
3.0	Change the median from a 32' depressed grassed to a GDOT standard 24' raised grassed median for the 4-lane divided section	1,075,000	
5.0	Reduce Width of Outside Paved Shoulder from 6.5' to 4'	456,000	
9.0	From Sta 130+00 to 170+00 Shift Horizontal Alignments Closer to Existing to Reduce Retaining Walls and Minimize Property Impacts	2,394,000	
10.0	From Sta 235+00 to 250+00 Shift Horizontal Alignments Closer to Existing to Reduce Earthwork and Minimize Property Impacts	278,000	
12.0	Eliminate Guardrails and Utilize Traversable Slopes at Specific Locations	17,000	

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-1.0

PAGE NUMBER: 1 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR
 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: ESTABLISH A CONSISTENT WIDTH FOR RIGHT OF WAY OF 150' AND UTILIZE EASEMENT BEYOND THE RIGHT OF WAY TO ALLOW PROPERTY OWNERS THE OPPORTUNITY TO USE THEIR LAND AFTER CONSTRUCTION.

ORIGINAL DESIGN: The current project concept report states proposed right of way to be 180' to 250' for the 4-lane divided section. The proposed right of way includes all of the construction limits and with no easements proposed. The preliminary right of way estimate indicates that there is a permanent easement factor of 50% of the fee simple estimate. Some right of way areas, such as Sta. 138+00, Sta. 259+00, and Sta. 345+00, are as much as 400' and the right of way is shown 40' to 50' beyond the limits of construction.

PROPOSED CHANGE: It is proposed to establish a consistent typical right of way width to include the roadway and the required clear zone. For the basic 4-lane divided roadway the edge of pavement is 40' from the centerline and the maximum required clear zone is 30' therefore the typical right of way width could be 140'. Common practice is to establish a more even number and therefore a basic 150' right of way width is proposed for this project. Additional right of way would be required at intersections with right turn lanes. Easements would be established beyond the right of way to build the slopes. This will allow the property owners the opportunity to use the property acquired as easement after construction is complete.

JUSTIFICATION: Having a consistent right of way width is common on many GDOT projects. With easement, the property owner is able to use the property after construction is complete.

ADVANTAGES:

- Reduces right of way cost
- Allows the property owner to maintain use of their land
- Maintains project function

DISADVANTAGES:

- None apparent

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 6,243,000		\$ 6,243,000
PROPOSED CHANGE:	\$ 5,078,000		\$ 5,078,000
SAVINGS:	\$ 1,165,000		\$ 1,165,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-1.0	PAGE NUMBER:	2 of 5
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Residential property fee simple	1/7	Ac	67.65	\$18,457	\$1,248,616
Commercial property fee simple	1/7	Ac	27.14	\$107,366	\$2,913,913
SUBTOTAL – COST TO PRIME					\$4,162,529
Counter offers and condemnation increases					50%
TOTAL CONTRACT COST					\$6,243,000

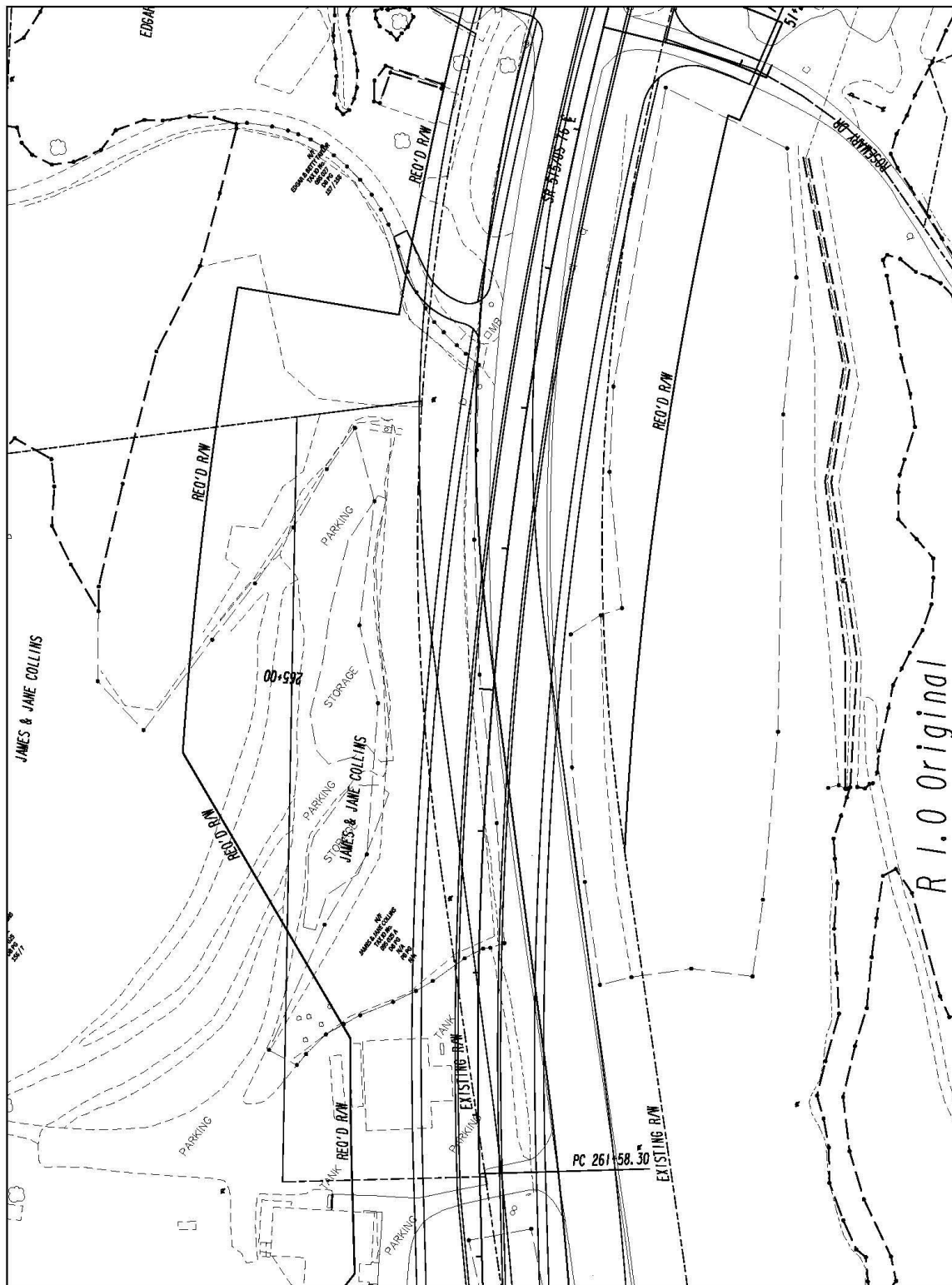
PROPOSED CHANGE

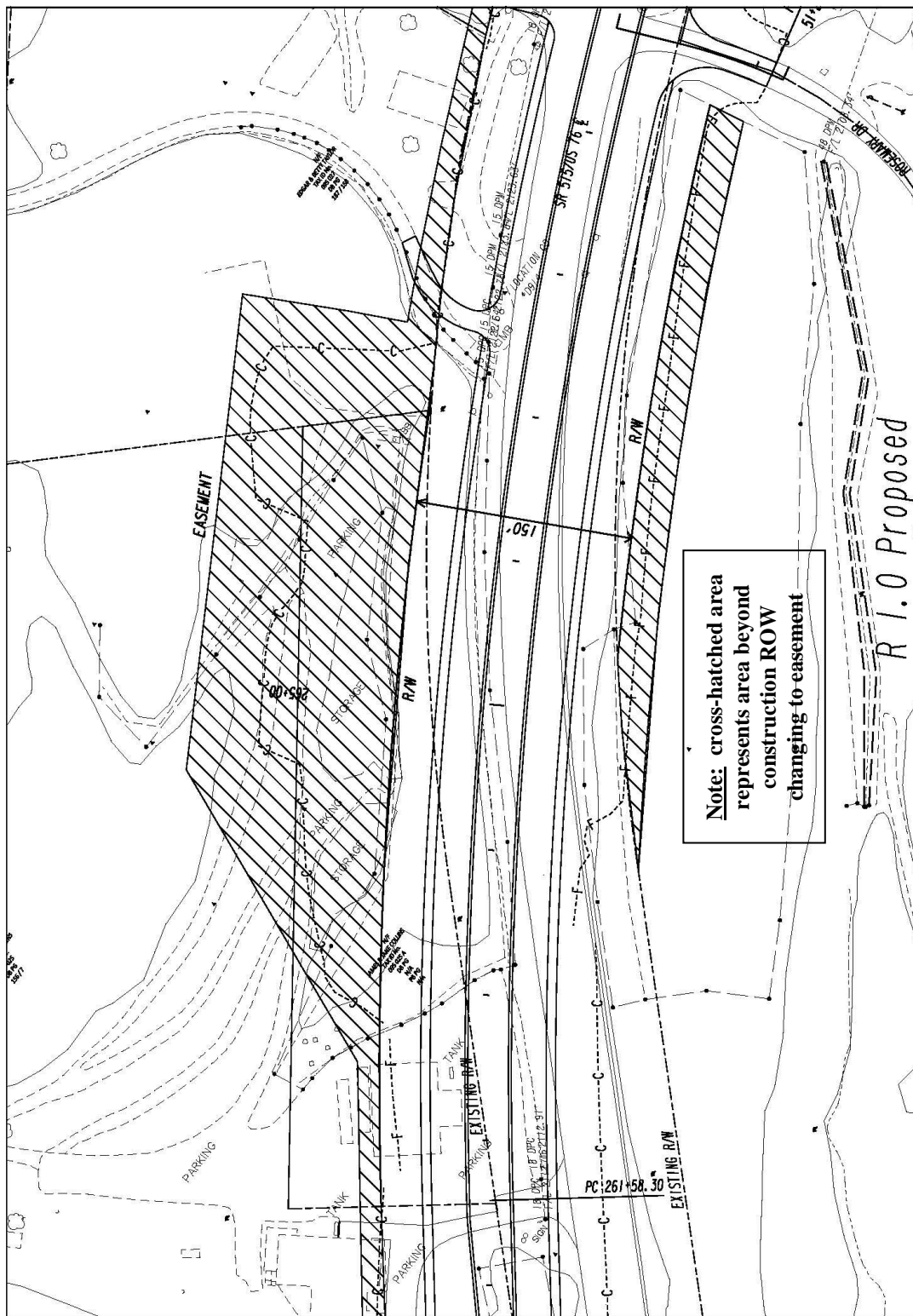
ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Residential property fee simple	1/7	Ac	43.32	\$18,457	\$799,557
Commercial property fee simple	1/7	Ac	16.85	\$107,366	\$1,809,117
Residential property easement	1/7	Ac	24.33	\$9,228.50	\$224,529
Commercial property easement	1/7	Ac	10.29	\$53,683	\$552,398
SUBTOTAL – COST TO PRIME					\$3,385,601
Counter offers and condemnation increases					50%
TOTAL CONTRACT COST					\$5,078,000

Difference [Original-Proposed] **\$1,165,000**

SOURCES

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ol style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|





CALCULATIONS

PROPOSAL NUMBER: R-1.0

PAGE NUMBER: 5 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Residential R/W Cost Calculations:

\$18,457/ac for partial property (Preliminary ROW Estimate)

\$9,228.50/ac for permanent easement at 50% of ROW

Commercial R/W Cost Calculations:

\$107,366/ac for partial property (Preliminary ROW Estimate)

\$53,683/ac for permanent easement at 50% of ROW

Mainline 38,765 lf

Bypass 6,825 lf

(67.65 Ac Residential + 27.14 Ac Commercial) = **94.79 Ac total required with various width**
72% is residential and 28% is commercial

Assume:

(38765 lf) x (150' proposed ROW – 100' existing r/w) / (43560 sf per Ac) = 44.50 Ac

(6825 lf) x (100' proposed ROW) / (43560 sf per Ac) = 15.67 Ac

Total = 60.17 Ac required ROW using consistent width

94.79 Ac – 60.17 Ac = **34.62 Ac changed to easement**

(60.17 Ac x 72%) = **43.32 Ac Residential ROW**

(60.17 Ac x 28%) = **16.85 Ac Commercial ROW**

(67.65 Ac – 43.32 Ac) = **24.33 Ac Residential easement**

(27.14 Ac – 16.85 Ac) = **10.29 Ac Commercial easement**

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-2.0

PAGE NUMBER: 1 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR
 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: FOR NEW PAVEMENT SECTIONS ON 4-LANE
 DIVIDED SEGMENTS, USE 11' INSIDE LANE WIDTHS
 IN LIEU OF 12'

ORIGINAL DESIGN: In the current design, all lane widths on new pavement sections are shown as having 12' widths.

PROPOSED CHANGE: It is proposed to construct the inside lanes on the 4-lane divided sections of roadway with an 11' width in lieu of 12'. The 4-lane divided section of the project extends from Sta 116+00 to 420+38.

JUSTIFICATION: With a full-depth 2' wide inside shoulder and with most trucks traveling in the right lane, an 11' wide inside lane should be sufficient. The data from the AASHTO Highway Safety Manual indicates that the Crash Modification Factor is virtually the same for 11' and 12' lane widths on divided roadway segments (see chart on the Sketch sheet within this proposal). This change will provide an acceptable design for divided roadways while also providing a construction cost savings to the project.

ADVANTAGES:

- Reduction in construction cost
- Acceptable design for divided roadways
- Less impervious area

DISADVANTAGES:

- May require a design exception for reduced lane width

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 357,000		\$ 357,000
PROPOSED CHANGE:	\$ 0		\$ 0
SAVINGS:	\$ 357,000		\$ 357,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-2.0	PAGE NUMBER:	2 of 5
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Pavement (reduction)	1/7	SY	6,764	\$52.77	\$357,000
SUBTOTAL – COST TO PRIME					\$357,000
MARKUP					Incl.
TOTAL CONTRACT COST					\$357,000

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
SUBTOTAL – COST TO PRIME					\$0
MARKUP					Incl.
TOTAL CONTRACT COST					\$0

Difference [Original-Proposed] **\$357,000**

SOURCES

- | | |
|---|---|
| 1. Project Cost Estimate
2. USC Estimate Database
3. GDOT Item Mean Summary
4. Means Estimating Manual | 5. Richardson's Estimating Manual
6. Vendor (Specify)
7. Attached Calculation Sheet |
|---|---|

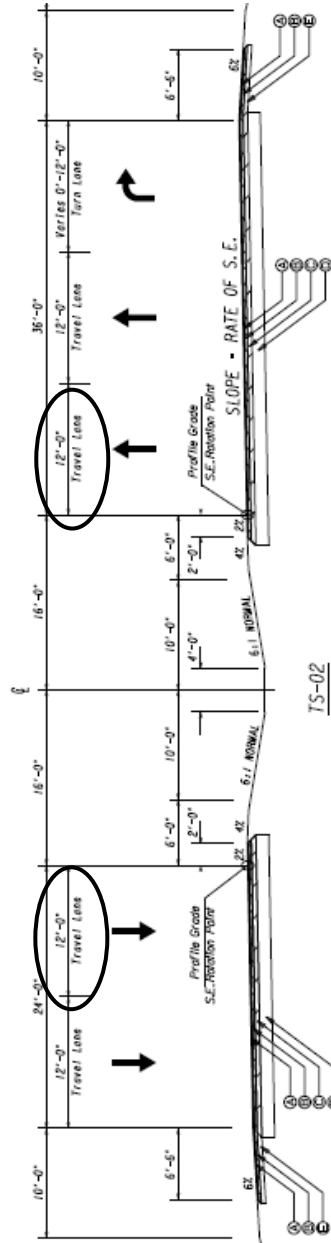
PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: R-2.0

PAGE NUMBER: 3 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Proposed Change: Revise 12'0" inside lanes to 11'0" max.



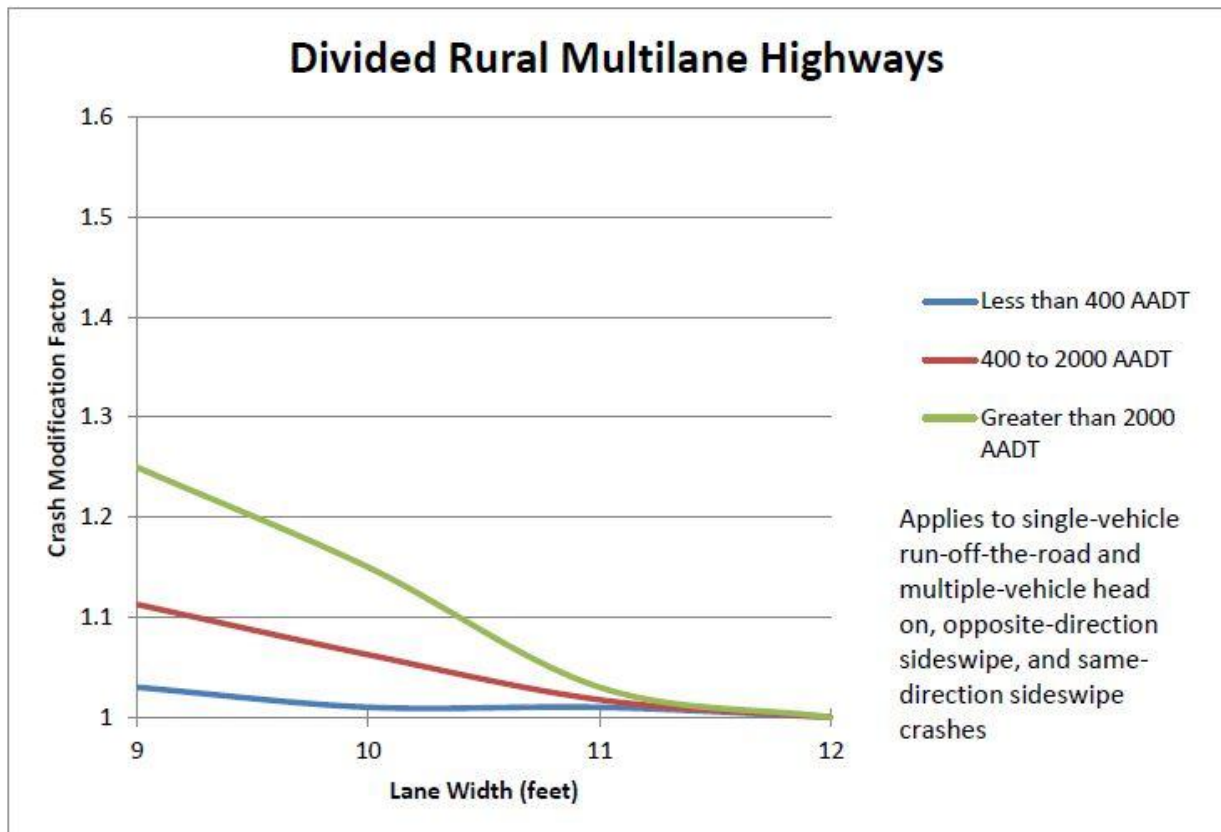
PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: R-2.0

PAGE NUMBER: 4 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Safety Effects of Lane Width



Note: chart based on data from AASHTO Highway Safety Manual

CALCULATIONS

PROPOSAL NUMBER: R-2.0

PAGE NUMBER: 5 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Current Design Pavement Cost Calculations:

310-5140: 14" GAB = \$20.00/SY

402-3121: 660#/sy Asph 25MM = $(660\#/2000\#)(\$61.51/T) = \$20.30/SY$

402-3190: 220# Asph 19MM = $(220\#/2000\#)(\$63.13/T) = \$6.94/SY$

402-3130: 165#/sy Asph 12.5MM = $(165\#/2000\#)(\$65.29/T) = \$5.39/SY$

413-1000: 2 layers tack coat = $0.035 \text{ gals/SY/layer} \times 2 \times \$1.98/\text{gal} = \$0.14$

Total pavement cost = **\$52.77/SY**

Pavement Area Calcs.

Inside lanes on divided highway sections and their construction lengths are as follows:

Sta 116+00 to 420+38; Total Length of divided highway: 30,438 LF

$30,438 \text{ LF} \times 1' \text{ width reduction/lane} \times 2 \text{ sides} = 60,876 \text{ SF}/9 = 6,764 \text{ SY}$

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-3.0

PAGE NUMBER: 1 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR
 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: CHANGE THE MEDIAN FROM A 32' DEPRESSED GRASSED TO A GDOT STANDARD 24' RAISED GRASSED MEDIAN FOR THE 4-LANE DIVIDED SECTION.

ORIGINAL DESIGN: In the current design, the 4-lane divided section from Sta. 116+00 to Sta. 426+00 has a 32' depressed grassed median.

PROPOSED CHANGE: It is proposed to use a standard GDOT 24' raised grassed median for the 4-lane divided section from Sta. 116+00 to Sta. 426+00.

JUSTIFICATION: The 24' raised grassed median is allowed in accordance with GDOT Design Policy Manual Table 6.6 for a 4-lane 55 mph rural Arterial Roadway. This greatly reduces the project footprint, reduces disturbances and impacts to property owners.

ADVANTAGES:

- Reduces property owner impacts
- Maintains project function
- Reduces right of way impacts
- Reduces disturbances
- Reduces walls required

DISADVANTAGES:

- None apparent

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 23,949,000		\$ 23,949,000
PROPOSED CHANGE:	\$ 22,874,000		\$ 22,874,000
SAVINGS:	\$ 1,075,000		\$ 1,075,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-3.0	PAGE NUMBER:	2 of 5
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
441-3999 Concrete V Gutter	3	LF	13,800	\$17.06	\$235,428
668-2100 Drop Inlet	1	Ea	100	\$1921.57	\$192,157
201-1500 Clearing and Grubbing	1	Lump	1	\$2,325,000	\$2,325,000
205-0001 Unclass Excavation	1	CY	1,500,000	3.82	\$5,730,000
617-0510 Perm Anch Walls	1	Lump	100%	\$9,222,300	\$9,222,300
Residential right of way	1	Ac	67.65	\$18,457	\$1,248,616
Commercial right of way	1	Ac	27.14	\$107,366	\$2,913,913
Counter Offers and Condemnation	1	\$	1	50% of ROW	\$2,081,264
SUBTOTAL – COST TO PRIME					\$23,949,000
MARKUP					--
TOTAL CONTRACT COST					\$23,949,000

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
441-6740 Conc Curb & Gutter Tp 7	3	LF	62,000	\$12.76	\$791,120
668-1100 Catch Basin	1	Ea	100	\$2209.54	\$220,954
201-1500 Clearing and Grubbing	1/7	Lump	92%	\$2,325,000	\$2,139,000
205-0001 Unclass Excavation	1	CY	1,380,000	\$3.82	\$5,271,600
617-0510 Perm Anch Walls	1/7	Lump	93%	\$9,222,300	\$8,576,739
Residential right of way	1/7	Ac	63.55	\$18,457	\$1,172,942
Commercial right of way	1/7	Ac	25.55	\$107,366	\$2,743,201
Counter Offers and Condemnation	1	\$	1	50% of ROW	\$1,958,071
SUBTOTAL – COST TO PRIME					\$22,874,000
MARKUP					--
TOTAL CONTRACT COST					\$22,874,000

Difference [Original-Proposed] **\$1,075,000**

SOURCES

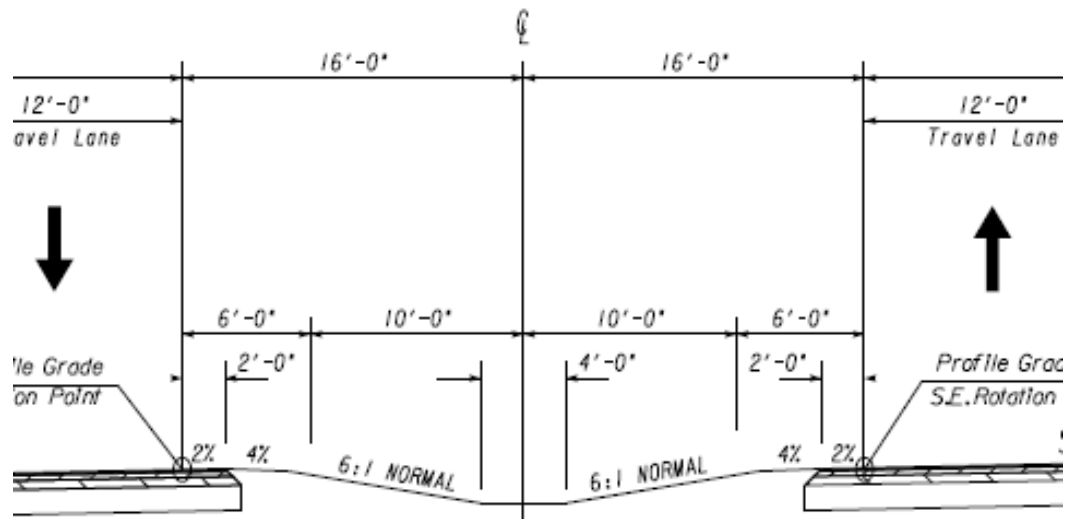
- | | |
|---|---|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|

ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER: R-3.0

PAGE NUMBER: 3 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-



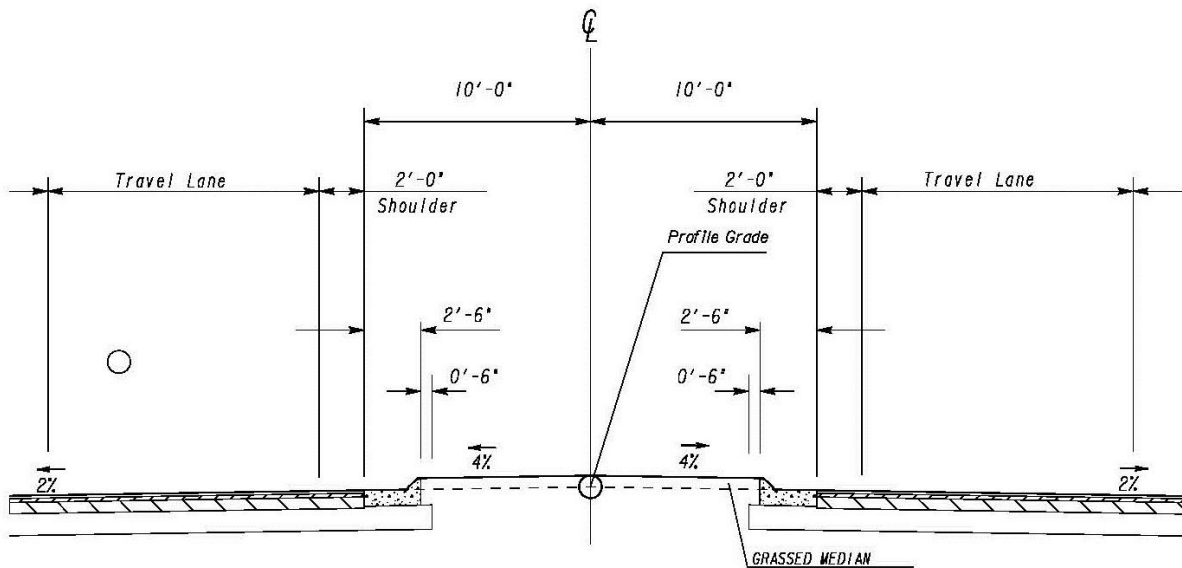
Current Median Design

PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: R-3.0

PAGE NUMBER: 4 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-



R-3 Proposed

CALCULATIONS

PROPOSAL NUMBER: R-3.0

PAGE NUMBER: 5 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Residential ROW Cost Calculations:

\$18,457/ac for partial property (Preliminary ROW Estimate)

\$9,228.50/ac for permanent easement at 50% of ROW

Counter Offers and Condemnation Increases = 50% added to property cost

Commercial ROW Cost Calculations:

\$107,366/ac for partial property (Preliminary ROW Estimate)

\$53,683/ac for permanent easement at 50% of ROW

Counter Offers and Condemnation Increases = 50% added to property cost

Sta. 116+00 to Sta. 426+00 = 31,000 lf of 4-lane divided roadway

(Pavement quantities remain the same)

Conc curb and gutter 31000 lf x 2 = 62,000 lf added

Conc V Gutter at median openings = 13,800 lf removed

Catch Basin on curb and gutter = 100 added

Drop inlets in median = 100 removed

(Assume drainage pipe remains the same)

31000 lf x (32' - 24' median width) / 43560 sf/ac = 5.69 Ac reduction in right of way (72% residential and 28% Commercial)

(16' + 24' + 10') x 2 = 100' between shoulder breaks with 32' median

(12' + 24' + 10') x 2 = 92' between shoulder breaks with 24' median

92/100 = 92% or 8% reduction in footprint

Therefore assume a 8% reduction in clearing and grubbing and unclassified excavation quantities

Assume average wall height = 30'

Assume wall moves in 4' along 2:1 slope and therefore is 2' lower and average height is 28'

28/30 = 7% reduction in wall height and cost

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-5.0

PAGE NUMBER: 1 of 4

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR
 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: REDUCE WIDTH OF OUTSIDE PAVED SHOULDER
 FROM 6.5' TO 4'

ORIGINAL DESIGN: In the current design, the paved portion of the outside shoulder is 6.5'.

PROPOSED CHANGE: It is proposed to reduce the paved width of the outside shoulder from 6.5' to 4'.

JUSTIFICATION: This project is on a local bike route. The AASHTO Policy Manual for Geometric Design of Highways and Streets, Section 7.2.3, allows a 4' paved width for shoulders where bicycles are to be accommodated. Thus, this proposed change meets AASHTO standards while providing a cost savings to the project.

ADVANTAGES:

- Reduction in construction cost
- Meets AASHTO standards
- Less impervious area

DISADVANTAGES:

- Will eliminate ability to incorporate rumble strips at edge of roadways where bicycles are to be accommodated

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 456,000		\$ 456,000
PROPOSED CHANGE:	\$ 0		\$ 0
SAVINGS:	\$ 456,000		\$ 456,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-5.0	PAGE NUMBER:	2 of 4
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Shoulder (reduction)	1/7	SY	23,470	\$19.42	\$456,000
SUBTOTAL – COST TO PRIME					\$456,000
MARKUP					Incl.
TOTAL CONTRACT COST					\$456,000

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
SUBTOTAL – COST TO PRIME					\$0
MARKUP					Incl.
TOTAL CONTRACT COST					\$0

Difference [Original-Proposed] **\$456,000**

SOURCES

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ol style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|

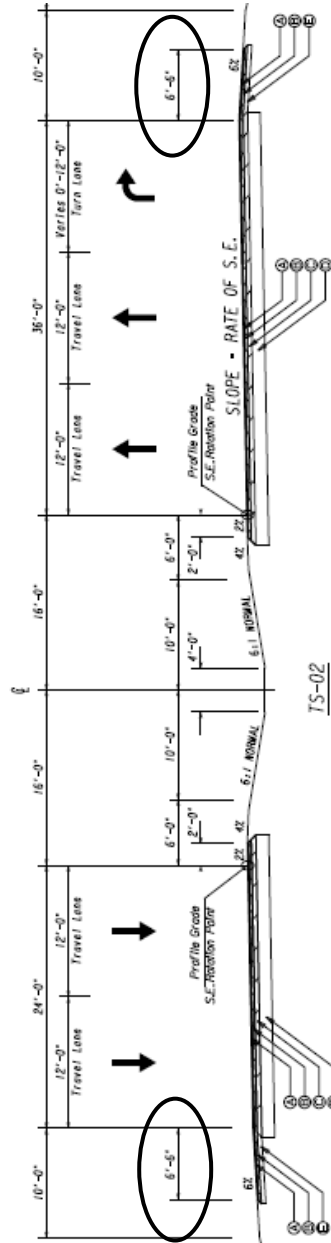
PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: R-5.0

PAGE NUMBER: 3 of 4

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Proposed Change: Revise 6'6" outside shoulder to 4'0" max.



CALCULATIONS

PROPOSAL NUMBER: R-5.0

PAGE NUMBER: 4 of 4

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Current Design Shoulder Cost Calculations:

310-5060: 6" GAB = \$7.02/SY

402-3190: 220# Asph 19MM = $(220\#/2000\#)(\$63.13/T) = \$6.94/SY$

402-3130: 165#/sy Asph 12.5MM = $(165\#/2000\#)(\$65.29/T) = \$5.39/SY$

413-1000: 1 layer tack coat = $0.035 \text{ gals/SY/layer} \times 1 \times \$1.98/\text{gal} = \$0.07$

Total pavement cost = **\$19.42/SY**

Shoulder Area Calcs.

Note: at location of walls, shoulder will extend to wall and no reduction occurs

Total length of project:: $38,765 \text{ LF} + 6,825 \text{ LF bypass} = 45,590 \text{ LF}$

Length of walls: 6,690 LF

Total length of project x 2 sides less wall length: $(45,590 \times 2) - 6,690 = 84,490$

$84,490 \text{ LF} \times 2.5' \text{ width reduction} = 211,225 \text{ SF}/9 = 23,470 \text{ SY}$

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-9.0

PAGE NUMBER: 1 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: FROM STA 130+00 TO STA 170+00 SHIFT HORIZONTAL ALIGNMENT CLOSER TO EXISTING ROADWAY TO REDUCE RETAINING WALLS AND MINIMIZE PROPERTY IMPACTS.

ORIGINAL DESIGN: From Sta 130+00 to Sta 170+00, the current design significantly shifts the proposed alignment away from the existing roadway. The shift results in large cut sections and tall walls.

PROPOSED CHANGE: It is proposed to shift the alignment to better align the proposed roadway with the existing roadway. The proposed alignment includes curves with radii of 1100' and 1250', which are adequate for the 55 mph speed. Proposed alignment shift will reduce wall height and excavation costs. Additionally, the proposed change will reduce property impacts and the costs associated with right of way acquisition and relocation.

JUSTIFICATION: The current design includes a significant realignment of the roadway and results in large cut sections and large retaining walls. Adjusting the alignment closer to the existing roadway, with curves that are adequate for the corridor speed, provides a significant cost savings and reduces property impacts, earthwork and retaining walls.

ADVANTAGES:

- Provides cost savings
- Reduces property relocation by one parcel
- Reduces construction time
- Reduces property impacts

DISADVANTAGES:

- May have minor additional construction slope along boundary of historic property

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 2,232,000		\$ 2,232,000
PROPOSED CHANGE:	\$ (162,000)		\$ (162,000)
SAVINGS:	\$ 2,394,000		\$ 2,394,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-9.0	PAGE NUMBER:	2 of 5
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Permanently Anchored Wall	1	LS	1	2,232,000	\$2,232,000
SUBTOTAL – COST TO PRIME					\$2,232,000
MARKUP					Incl.
TOTAL CONTRACT COST					\$2,232,000

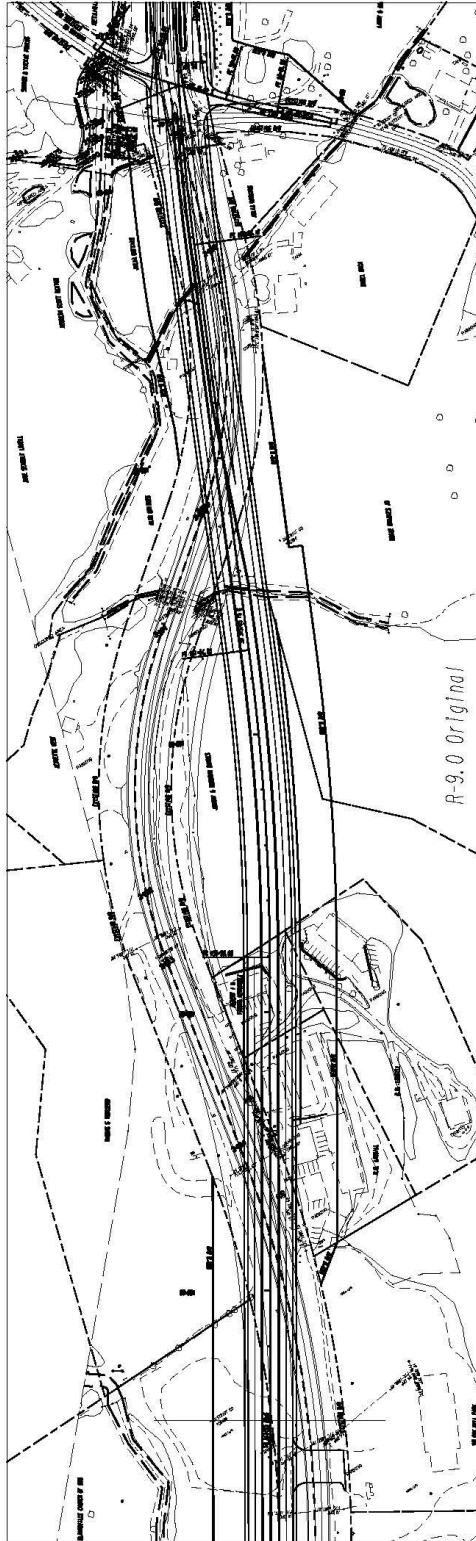
PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Permanently Anchored Wall	1/7	LS	1	1,176,247	\$1,176,247
Unclass. Excavation (Reduction)	1/7	CY	243,604	3.82	(\$930,567)
Right of Way (Reduction)	1/7	AC	3.80	107,366	(\$407,991)
SUBTOTAL – COST TO PRIME					(\$162,000)
MARKUP					--
TOTAL CONTRACT COST					(\$162,000)

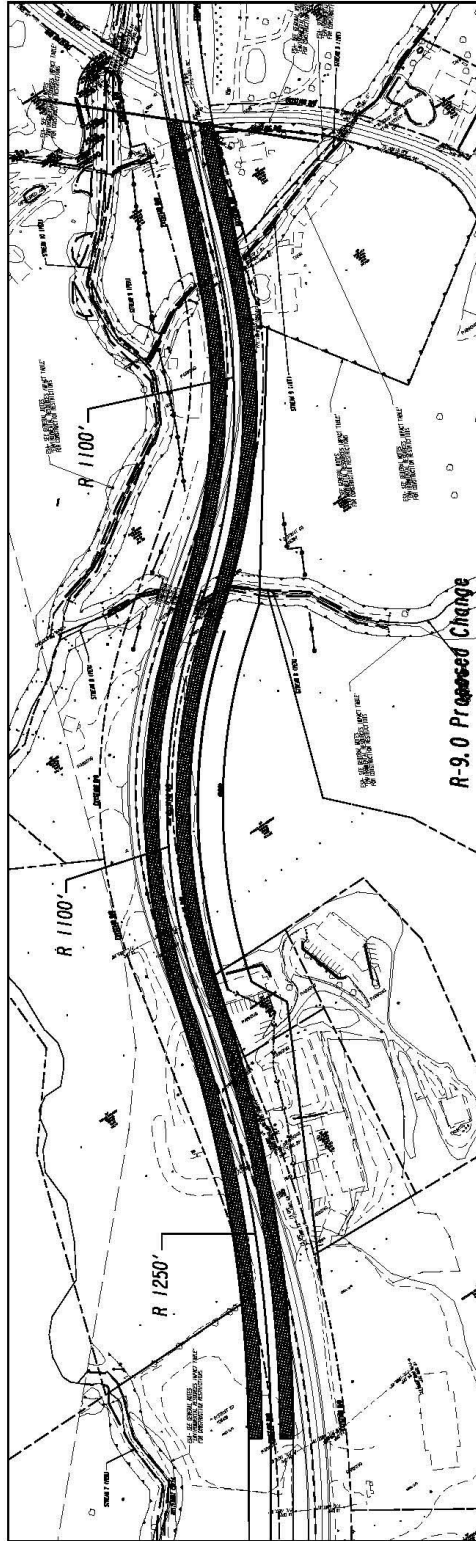
Difference [Original-Proposed] **\$2,394,000**

SOURCES

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ol style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|



R-9.0 Current Design
Page 3 of 5



R-9.0 Proposed Change
Page 4 of 5

CALCULATIONS

PROPOSAL NUMBER: R-9.0

PAGE NUMBER: 5 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Anchored Wall:

Original Wall Area = 58,350 sq ft (Estimated from Original Cross Sections)

Proposed Wall Area = 30,750 sq ft (Estimated from Original Cross Sections)

Area Change Ratio = $30,750 / 58,350 = 0.527$

Original Cost = \$2,232,000

Proposed Cost = $\$2,232,000 \times 0.527 = \$1,176,247$

Unclassified Excavation:

Reduction in excavation estimated as the area between the original and proposed walls at each 50 foot station. Volume estimated a sum of areas over tributary 50 ft lengths.

Area = $(1/2)[\text{Original Wall Height} + \text{Proposed Wall Height}][\text{Distance between walls}]$

Volume = $\Sigma[\text{Area} \times 50 \text{ ft tributary length}]$

Proposed Reduction = $\$3.82/\text{cu yd} \times 243,604 \text{ cu yd} = \$930,567$

Right of Way:

Estimated Reduction in right of way = 3.80 acres

Unit Cost = \$107,366 (Property assumed to be commercial property)

Proposed Reduction = $3.80 \text{ acres} \times \$107,366 = \$407,991$

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-10.0

PAGE NUMBER: 1 of 8

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR
 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: FROM STA 235+00 TO 250+00 SHIFT HORIZONTAL ALIGNMENTS CLOSER TO EXISTING TO REDUCE EARTHWORK AND MINIMIZE PROPERTY IMPACTS.

ORIGINAL DESIGN: From Sta 235+00 to Sta 250+00, the current design significantly shifts the proposed alignment away from the existing roadway. The shift results in large cut sections and property impacts.

PROPOSED CHANGE: It is proposed to shift the alignment to better align the proposed roadway with the existing roadway. The revised alignment includes curves with radii of 1100' and 3000', which are adequate for the 55 mph speed. Proposed alignment shift will reduce earthwork costs, and reduce commercial right of way acquisition.

JUSTIFICATION: The current design includes a realignment of the roadway in this area that results in large cut sections and property impacts. Adjusting the alignment closer to the existing roadway, with curves that are adequate for the corridor speed, provides a construction cost savings and reduces property impacts and earthwork efforts.

ADVANTAGES:

- Provides cost savings
- Reduces right of way acquisition
- Reduces construction time
- Reduces property impacts

DISADVANTAGES:

- None apparent

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 0		\$ 0
PROPOSED CHANGE:	\$ (278,000)		\$ (278,000)
SAVINGS:	\$ 278,000		\$ 278,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-10.0	PAGE NUMBER:	2 of 8
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
SUBTOTAL – COST TO PRIME					
MARKUP					
TOTAL CONTRACT COST					

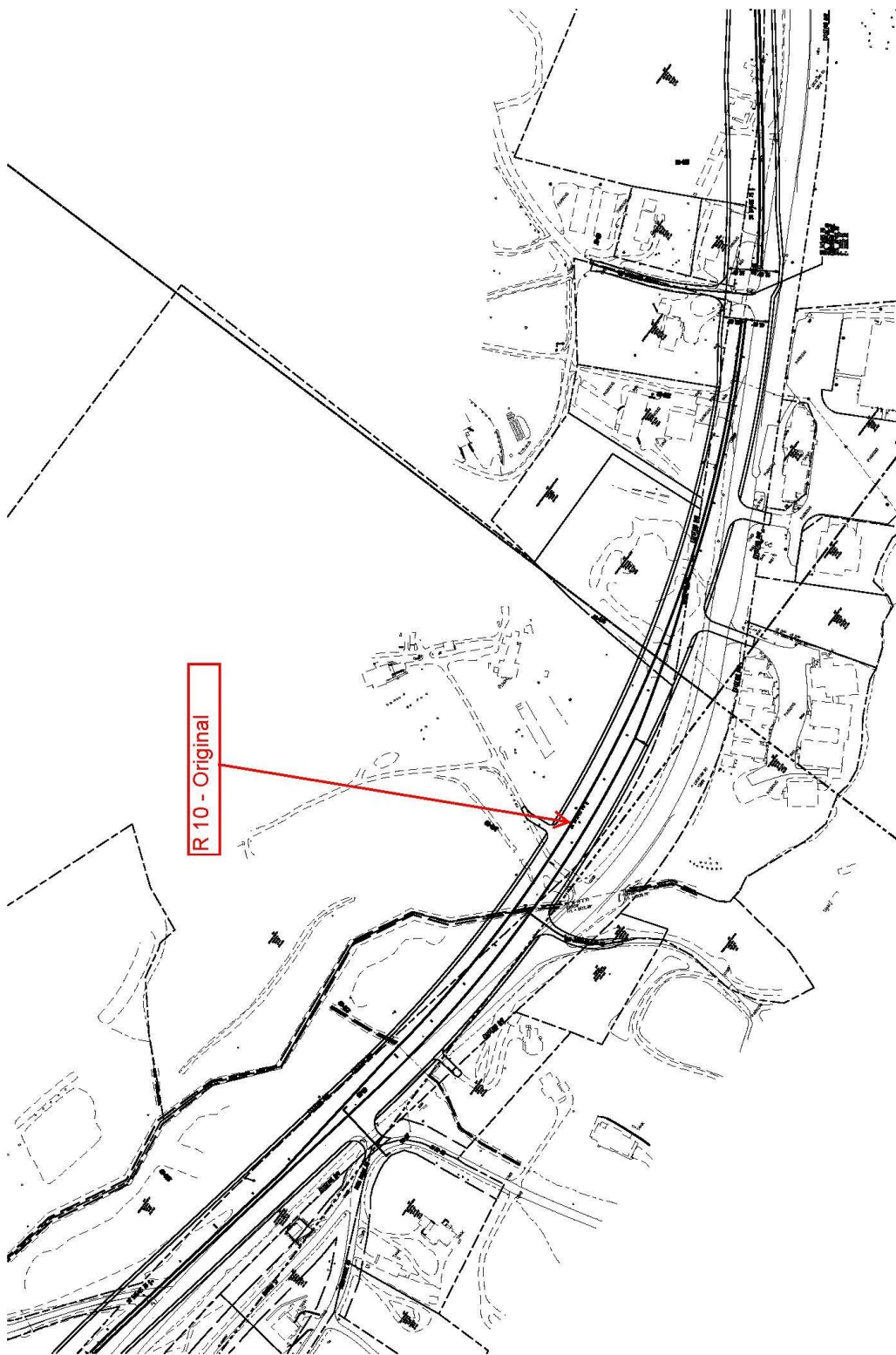
PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
Unclass. Excavation (Reduction)	1/7	CY	44,616	3.82	(\$170,433)
Right of Way (Reduction)	1/7	AC	1.0	107,366	(\$107,366)
SUBTOTAL – COST TO PRIME					(\$278,000)
MARKUP					--
TOTAL CONTRACT COST					(\$278,000)

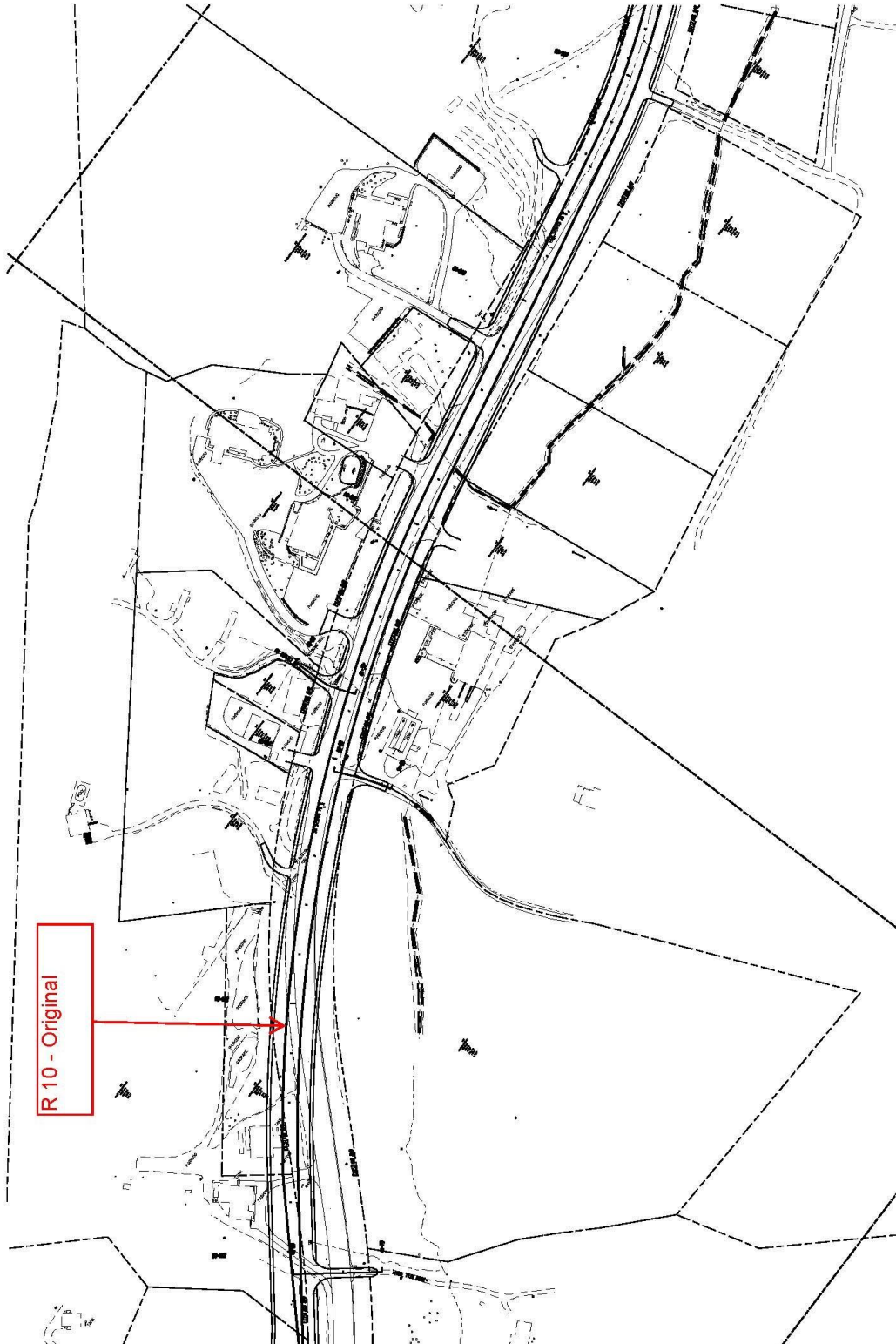
Difference [Original-Proposed] **\$278,000**

SOURCES

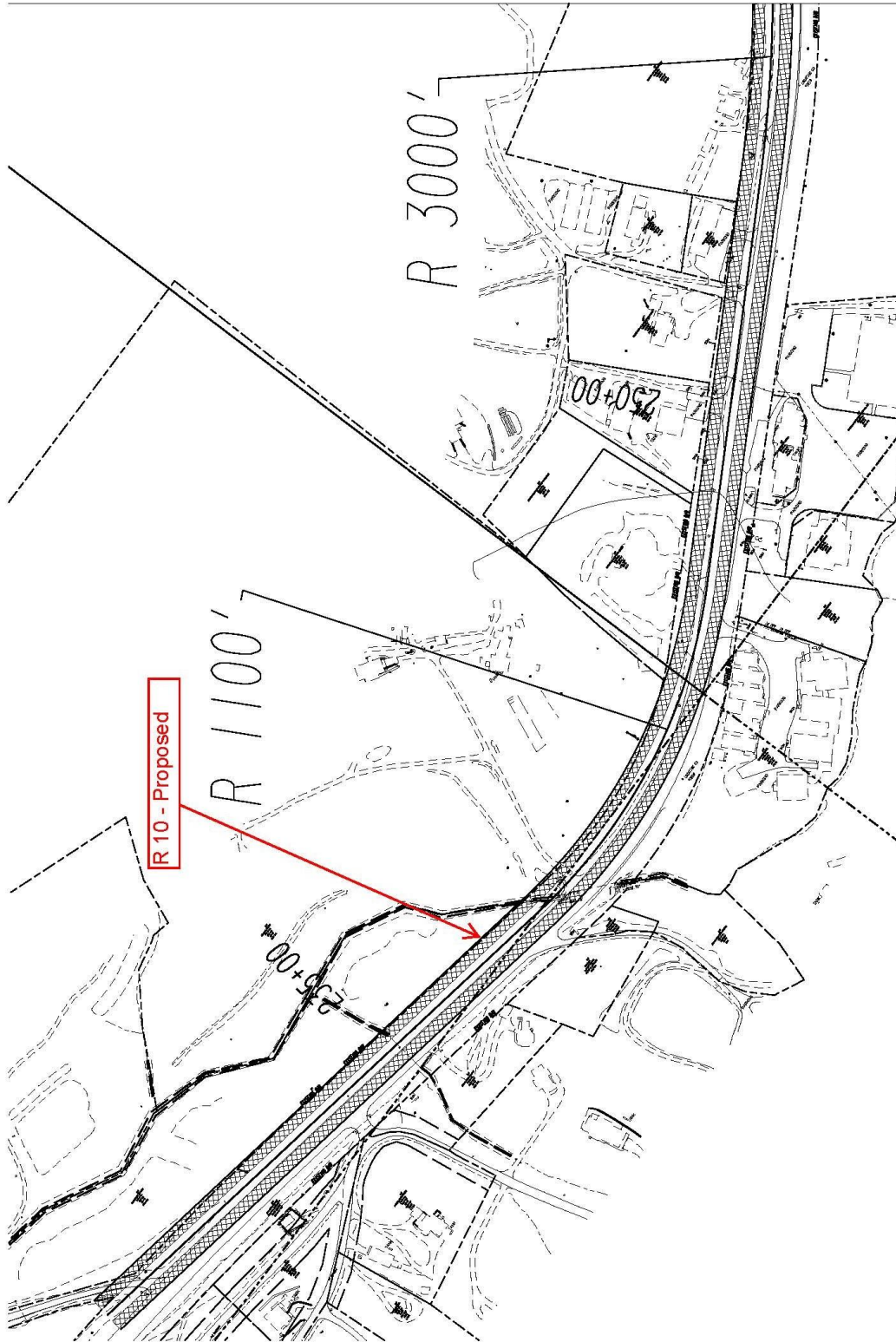
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ol style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|



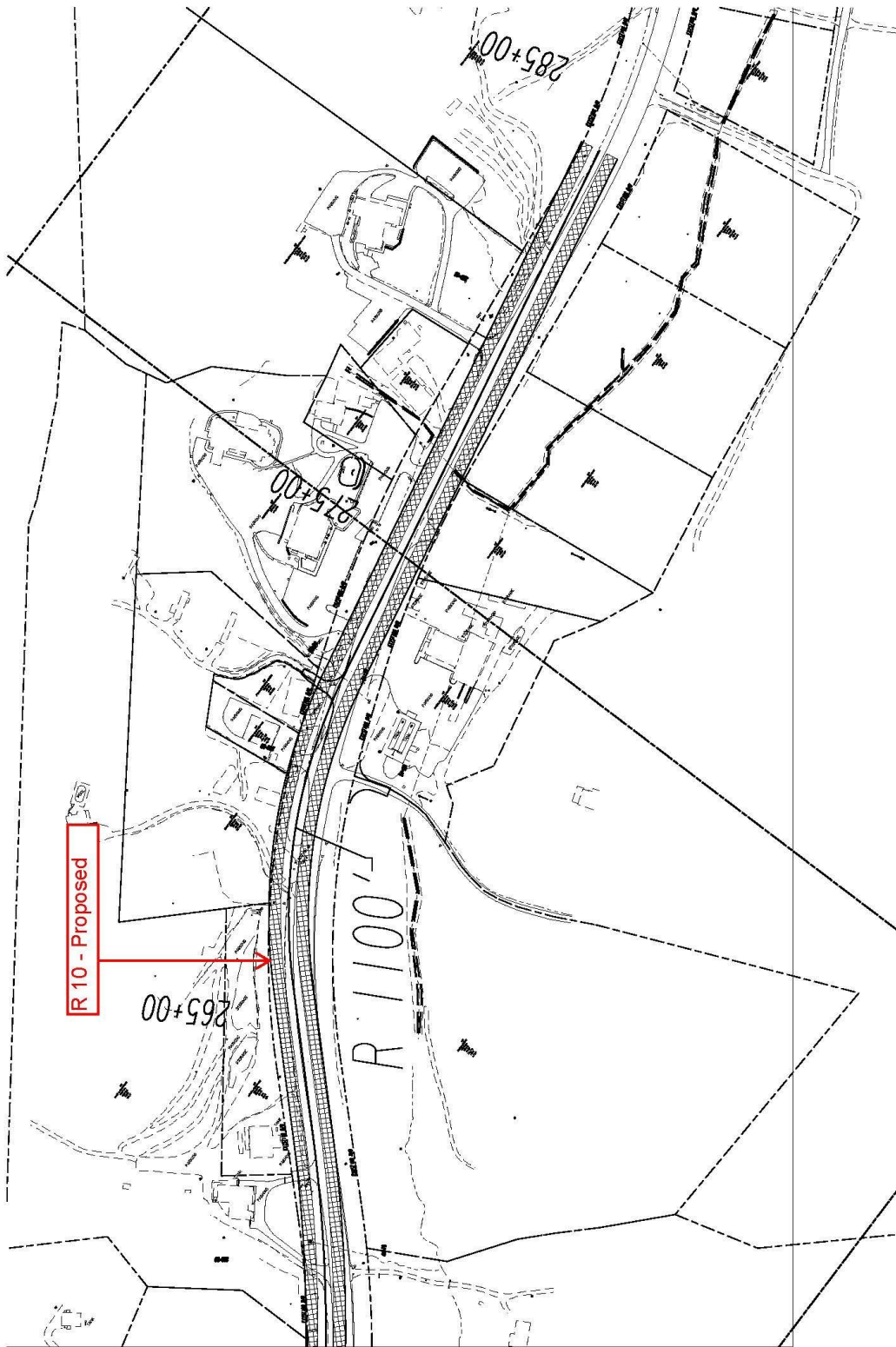
R-10.0 Current Design – 1 of 2
Page 3 of 8

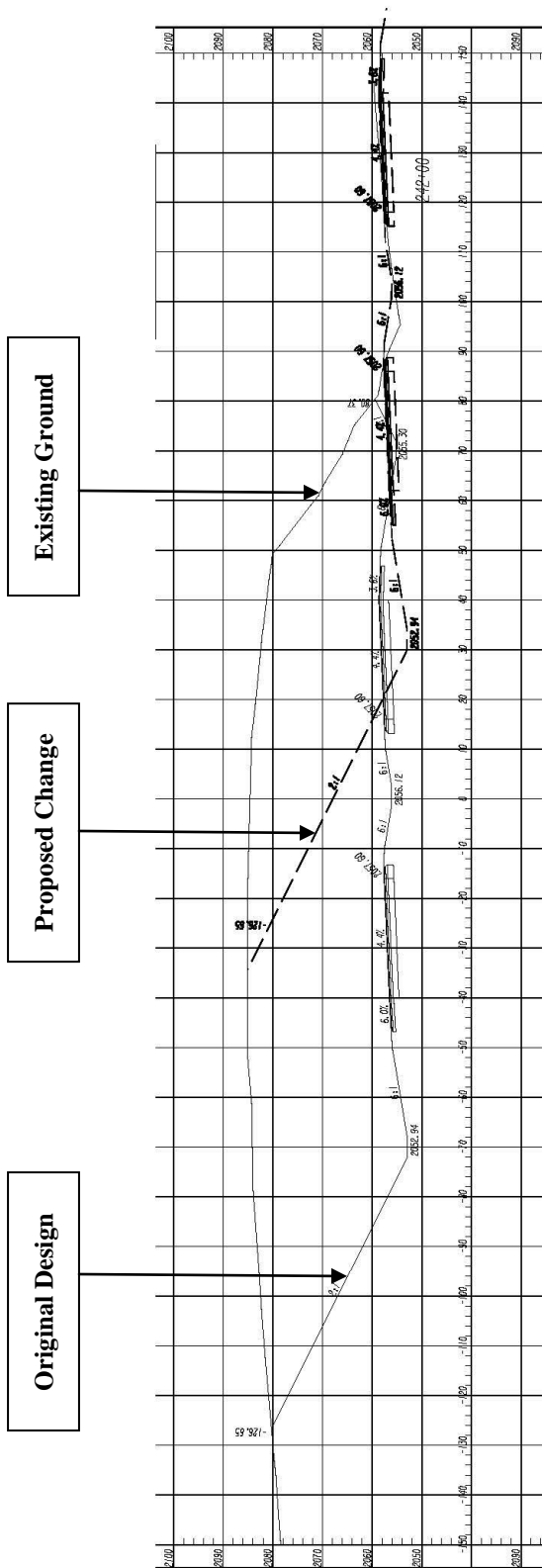


R-10.0 Current Design – 2 of 2
Page 4 of 8



R-10.0 Proposed Change – 1 of 2
Page 5 of 8





R-10.0 Sample Cross Section – Sta 242+00
Page 7 of 8

CALCULATIONS

PROPOSAL NUMBER: R-10.0

PAGE NUMBER: 8 of 8

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Shifted Alignment Cost Comparison: Sta 235+00 to Sta 250+00

Unclass Excav: 205-0001 CY Unclass Excav

Sta	Average Height	Distance Between	Area	Volume
	Hp	L	Aem	Vem
	(ft)	(ft)	(sq ft)	(cy ft)
241+00	15	65	975.0	
241+50	20	80	1600.0	64375.0
242+00	25	90	2250.0	96250.0
242+50	35	90	3150.0	135000.0
243+00	35	85	2975.0	153125.0
243+50	35	80	2800.0	144375.0
244+00	30	80	2400.0	130000.0
244+50	30	80	2400.0	120000.0
245+00	20	80	1600.0	100000.0
245+50	15	80	1200.0	70000.0
246+00	15	60	900.0	52500.0
246+50	15	52	780.0	42000.0
247+00	10	45	450.0	30750.0
247+50	10	38	380.0	20750.0
248+00	10	30	300.0	17000.0
248+50	10	23	230.0	13250.0
249+00	10	15	150.0	9500.0
249+50	5	8	40.0	4750.0
250+00	5	0	0.0	1000.0
				1204625.0

L = Existing Offset - Proposed Offset

Aem = (Hp)(L)

Vem = (1/2)(Aem2 + Aem1)(Sta2 - Sta1)

Total Volume = 1204625.0 cu ft

Total Volume = 44616 cu yd

Right of way impact: reduction in 1 acre of commercial property

VALUE ENGINEERING PROPOSAL

PROPOSAL NUMBER: R-12.0

PAGE NUMBER: 1 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-
PROJECT TITLE: SR 515/US 76 from CS 2898/Young Harris St to CR 153/Timberline Dr
 Union/Towns Counties

PROPOSAL DESCRIPTION: ELIMINATE GUARDRAILS AND UTILIZE TRAVERSABLE SLOPES AT SPECIFIC LOCATIONS.

ORIGINAL DESIGN: The original design uses guardrails with 2:1 slopes in lieu of traversable slopes.

PROPOSED CHANGE: It is proposed to eliminate or reduce the guardrails at 6 locations and use 4:1 traversable slopes. NOTE: Three of the locations will also eliminate TP1 Anchors.

JUSTIFICATION: The traversable slopes can be placed within the proposed right of way as shown; thus, this proposal eliminates construction of unnecessary features and provides cost savings to the project. Elimination of guardrail also eliminates ongoing maintenance efforts and costs on these features.

ADVANTAGES:

- Provides cost savings
- Eliminates unnecessary guardrail
- Reduces maintenance

DISADVANTAGES:

- None Apparent

	INITIAL COST	OPERATING COST	TOTAL LIFE- CYCLE COST
ORIGINAL DESIGN:	\$ 17,000		\$ 17,000
PROPOSED CHANGE:	\$ 0		\$ 0
SAVINGS:	\$ 17,000		\$ 17,000

COST ESTIMATING WORKSHEET

PROPOSAL NUMBER:	R-12.0	PAGE NUMBER:	2 of 5
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PROJECT #/PI #:	APD00-0056-02(029) / 122900-
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ORIGINAL DESIGN

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
STA. 108+50 to STA. 110+50	1/7	LF *	200	15.20 *	\$3,040
STA. 127+00 to STA. 127+50	1/7	LF	50	15.20	\$760
STA. 164+50 to STA. 165+50	1/7	LF	100	15.20	\$1,520
STA. 218+00 to STA. 118+50	1/7	LF *	50	15.20 *	\$760
STA. 413+50 to STA. 415+50	1/7	LF *	200	15.20 *	\$3,040
STA. 458+00 to STA. 459+50	1/7	LF	150	15.20	\$2,280
TP 1 Anchors	1/7	EA	6	854	\$5,124
SUBTOTAL – COST TO PRIME					\$17,000
MARKUP					Incl.
TOTAL CONTRACT COST					\$17,000

PROPOSED CHANGE

ITEM	SOURCE CODE	U/M	QTY	UNIT COST	TOTAL COST
STA. 108+50 to STA. 110+50	1/7				
STA. 127+00 to STA. 127+50	1/7				
STA. 164+50 to STA. 165+50	1/7				
STA. 218+00 to STA. 118+50	1/7				
STA. 413+50 to STA. 415+50	1/7				
STA. 458+00 to STA. 459+50	1/7				
SUBTOTAL – COST TO PRIME					0.00
MARKUP					--
TOTAL CONTRACT COST					0.00

Difference [Original-Proposed] **\$17,000**

SOURCES

- | | |
|---|---|
| <ul style="list-style-type: none"> 1. Project Cost Estimate 2. USC Estimate Database 3. GDOT Item Mean Summary 4. Means Estimating Manual | <ul style="list-style-type: none"> 5. Richardson's Estimating Manual 6. Vendor (Specify) 7. Attached Calculation Sheet |
|---|---|

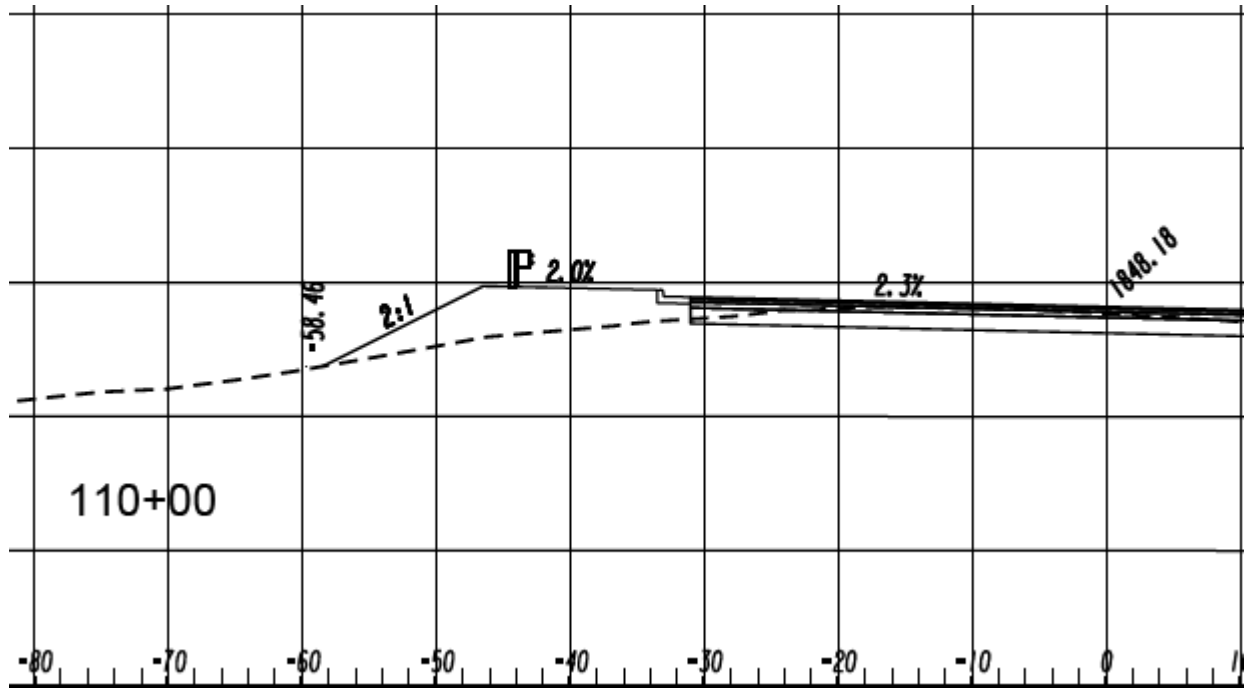
* Locations include eliminating two TP 1 Anchors.

ORIGINAL DESIGN SKETCH/DETAIL

PROPOSAL NUMBER: R-12.0

PAGE NUMBER: 3 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-



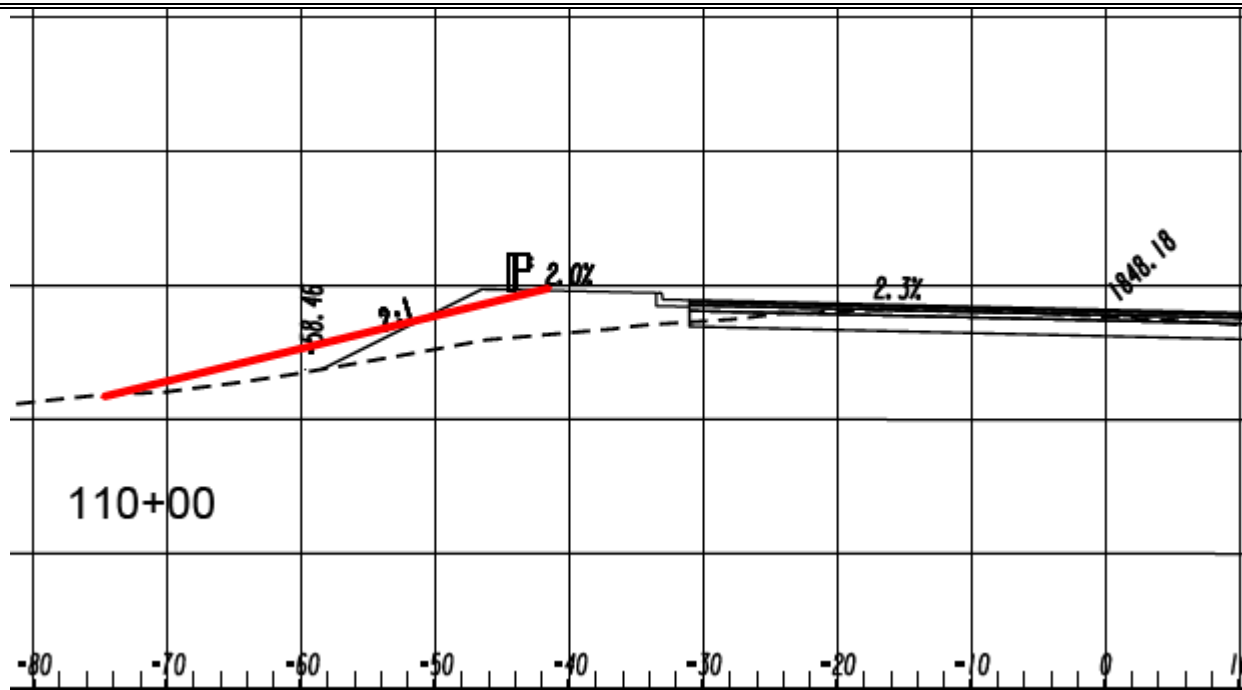
Typical Cross Section at Guardrail
Original Design

PROPOSED CHANGE SKETCH/DETAIL

PROPOSAL NUMBER: R-12.0

PAGE NUMBER: 4 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-



Red line indicates 4:1 Slope

Typical Cross Section at Guardrail
Proposed Design

CALCULATIONS

PROPOSAL NUMBER: R-12.0

PAGE NUMBER: 5 of 5

PROJECT #/PI #: APD00-0056-02(029) / 122900-

Location	Begin Station	End Station	Length LF	Estimated Savings
1	108+50	110+50	200 *	\$ 4,748
2	127+00	127+50	50	\$ 760
3	164+50	165+50	100	\$ 1,520
4	218+00	218+50	50 *	\$ 2,468
5	413+50	415+50	200 *	\$ 4,748
6	458+00	459+50	150	\$ 2,280
Total			750	\$ 16,524

* Indicates locations where entire guardrail length may be eliminated. Cost includes eliminating two TP 1 Anchors.

VE STUDY SIGN-IN SHEET

Project No.: APD00-0056-02(029) County: Union & Towns PI No.: 122900- Date: August 10 & 13, 2015

Days

FIRST	LAST	NAME	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓	✓	Lisa L. Myers	Engineering Services	404-631-1770	lmyers@dot.ga.gov
✓	✓	Matt Sanders	Engineering Services	404-631-1752	msanders@dot.ga.gov
✓	O	Ken Werho	Traffic Operations	404-635-8144	kwerho@dot.ga.gov
✓	✓	Bill DuVall	Bridge Design	404-631-1883	bduvall@dot.ga.gov
✓	✓	Robert Reid Jr.	Engineering Services	404-631-1754	rreid@dot.ga.gov
✓	✓	Tom Orr	MBP	404-414-9951	torr@mbpce.com
✓	✓	Buffy Campbell	MBP	404-862-6862	bcampbell@mbpce.com
✓	✓	Jerry Brooks	Kimley-Horn	678-849-7433	jerry.brooks@kimley-horn.com
✓	✓	George Manning	Michael Baker	678-966-6629	george.manning@mbakerintl.com
✓	✓	Gary Newton	Kimley-Horn	678-533-3902	gary.newton@kimley-horn.com
✓	O	Steve Adewale	GDOT-OPD	404-631-1578	sadewale@dot.ga.gov
✓	O	Glenn Bowman	Engineering	404-631-1519	gbowman@dot.ga.gov
✓	✓	Richard O'Hara	GDOT-OES	404-631-1169	ro'hara@dot.ga.gov
✓	✓	Dom Saulino	HNTB	404-946-5745	dsaulino@hntb.com
✓	✓	Chris Seckinger	HNTB	404-946-5733	cseckinger@hntb.com
✓	O	Chris Raymond	Traffic Operations	404-635-2814	cdraymond@dot.ga.gov
		<u>District #1</u>			
✓	✓	Rob Mabry	D1-CST	706-348-4848	rmabry@dot.ga.gov
✓	O	Chris York	D1-CST	706-348-4848	cyork@dot.ga.gov

✓ Check all that attend ☐ Did Not Attend **18** Attended Project Overview (Day 1) **13** Attended Project Presentation (Day 4)

VALUE ENGINEERING STUDY

FUNCTION ANALYSIS

The following functions for the SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive project were identified during discussions with the V.E. participants on the first day of the study. These two-word functions consist of an active verb, and a quantifiable (measurable) noun. The functions represent the proposed capital improvement expenditures of the project, and assist the V.E. Team in becoming familiar with the needs and long-term goals for the project. The Basic Function of the project is to “Reduce Congestion”. The following are considered by the V.E. Team to be Secondary and Supporting Functions.

Verb	Noun		Verb	Noun
Accommodate	Pedestrians		Maintain	Access
Accommodate	Cyclists		Minimize	Impacts
Support	Commerce		Improve	Operations
Improve	Safety		Convey	Water
Span	Water		Re-establish	Vegetation
Enhance	Mobility		Award	Contract
Stimulate	Growth		Control	Erosion
Direct	Traffic		Control	Traffic
Direct	Flow		Protect	Property
Separate	Traffic		Maintain	Sight Distance
Maintain	Traffic		Inform	Traveler
Support	University		Retain	Earth
Correct	Deficiencies		Excavate	Earth
Reduce	Delays		Divert	(Truck) Traffic
Lessen	Impact		Bypass	Business District
	(on campus)			
Symbolize	Gateway		Reduce	Crash Frequency

VALUE ENGINEERING STUDY

COST MODEL/DISTRIBUTION

**Project # APD00-0056-02(029) PI No. 122900-
SR 515/US 76 from CS 2898/Young Harris St to CR 153/Timberline Dr
Union/Towns County, Georgia**

ITEM	COST \$	% OF TOTAL
RIGHT-OF-WAY	25,960,000	34.35%
ASPHALT CONCRETE PAVING	12,441,530	16.46%
RETAINING WALLS	10,144,530	13.42%
AGGREGATE BASE COURSE	6,636,589	8.78%
EARTHWORK	6,312,059	8.35%
TRAFFIC CONTROL	2,715,203	3.59%
DRAINAGE SYSTEM	2,672,483	3.54%
CLEARING AND GRUBBING	2,557,500	3.38%
GRASSING/EROSION CONTROL	2,445,647	3.24%
BRIDGES/STRUCTURES	1,307,351	1.73%
SIGNALS	1,100,000	1.46%
GUARDRAILS	472,517	0.63%
SIGNAGE/MARKING	280,492	0.37%
CURB & GUTTER	205,313	0.27%
SIDEWALKS	203,034	0.27%
FIELD OFFICE	92,908	0.12%
DEMOLITION	24,581	0.03%
CONCRETE SLABS/APRONS/MEDIANS	0	0.00%
FENCING	0	0.00%
LIGHTING	0	0.00%
LANDSCAPING	0	0.00%
*TOTAL - PROJECT	75,571,736	100.00%
*Does not include Engrg & Inspection, Fuel Adjustment or Liquid AC Adjustment		

VALUE ENGINEERING STUDY

BRAINSTORMING OR SPECULATION IDEAS

PROJECT TITLE: SR 515/US 76 from CS 2898 to CR 153
PROJECT LOCATION: UNION/TOWNS COUNTY, GEORGIA

NO.	IDEA	RANK
BRIDGE (B)		
1.0	Update Bridge Plans to Coordinate Location, Configuration and Alignment	Cmmt
2.0	Utilize Exposed Rock at Specific Locations , Where Confirmed, in lieu of Wall Construction	Cmmt
ROADWAY (R)		
1.0	Establish a Consistent Width for Right-of-Way and Utilize Easement Beyond Right-of-Way Limits	5
2.0	For New Pavement Sections on 4-Lane Divided Sections, Use 11' Inside Lane Widths in lieu of 12'	4
3.0	Reduce Median Width from 32' to 24'	4
4.0	Reduce 2-way Turn Lane from 14' to 12'	Drop
5.0	Reduce Width of Outside Paved Shoulder from 6.5' to 4'	4
6.0	Shift Horizontal Alignment at Specific Locations to Reduce or Eliminate Retaining Walls	See 9.0 & 10.0
7.0	Shift Vertical Alignment at Specific Locations to Reduce or Eliminate Retaining Walls	Drop
8.0	Separate Horizontal and/or Vertical Alignments at Specific Locations to Reduce or Eliminate Retaining Walls	Drop
9.0	From Sta 130+00 to 170+00 Shift Horizontal Alignments Closer to Existing to Reduce Wall and Minimize Property Impacts	4
10.0	From Sta 235+00 to 250+00 Shift Horizontal Alignments Closer to Existing to Reduce Earthwork	4
11.0	Eliminate Sidewalks Where None Exist Currently	Drop
12.0	Eliminate Guardrails and Utilize Traversable Slopes at Specific Locations	4
13.0	Ensure Slopes on Cross Sections Match Those Shown on Typical Road Sections	Cmmt
14.0	Construct Retaining Wall from Sta 255+00 to 267+00 to Reduce Earthwork	Drop

The rankings indicated as "Drop" were ideas that were investigated by the V.E. Team during the workshop but did not prove to be feasible for consideration.

VALUE ENGINEERING WORKSHOP AGENDA

For GEORGIA DEPARTMENT OF TRANSPORTATION

**Project # APD00-0056-02(029) PI No. 122900-
SR 515/US 76 from CS 2898/Young Harris Street to CR 153/Timberline Drive
Union/Towns County, Georgia**

28 HOUR - V.E. STUDY

10-13 August 2015

The value engineering workshop for the subject project will be conducted for 3-1/2 days from 10-13 August 2015, **in the Engineering Services Conference Room (5CR1L2) on the 5th floor of the GDOT General Office Facility located at 600 W. Peachtree Street NW, Atlanta GA 30308; POC – Matt Sanders @ (404)631-1752 voice**

Pre-workshop Activities

The V.E. Team Leader coordinates logistics with GDOT, and confirms project objectives and any unique requests, and develops a cost model for the project. The V.E. Team receives and reviews all project documents.

MONDAY

0800 - 0900

V.E. Team Introduction Phase

Tom Orr, P.E., CVS
Team Leader, on behalf of U.S. Cost
(**V.E. Team Only**)

The VETL will review previous events along with activities planned for the week and outline several areas which may be investigated by the V.E. team.

The team members will discuss their initial impression and understanding of the project with other team members based on their pre-study review of the project plans, cost estimates, and available calculations. The V.E. Team Leader will provide cost models, and cost bar graphs to help the team identify the high-cost features of the project.

0900 - 1030

Project Design Briefing

V.E. Team; A/E, GDOT

The A/E project design manager will discuss the project constraints/requirements and the proposed design solution(s) in detail. The V.E. team members will ask questions as appropriate to completely understand the project requirements and the proposed design solution (both alternatives considered and those recommended by the design team).

MONDAY (CONTINUED)

1030 - 1200 **Function Analysis and Risks** V.E. Team

The V.E. team will discuss the required functions and inherent risks of the project. The project cost model will be analyzed to identify functions provided by all project features.

1200 - 1300 **Lunch**

1300 - 1600 **Creative Phase** V.E. Team

The V.E. team will creatively review, Brainstorm, and tabulate possible design alternatives for the project. While the designer's solution will serve as the "baseline", the team will identify alternatives not in the recommended solution, but deserving of further investigation. Each project feature will be carefully analyzed with the basic questions in mind:

What is the system/item?

What does it do (what is its basic function)?

What must it do?

What does it cost?

What is the item worth?

What else will do the same, or a better job?

What does that alternative cost?

During the creative phase, the team will not judge the ideas. The essential requirements for the project, however, must always be considered.

1600 - 1700 **Analysis Phase** V.E. Team

During this phase, all of the ideas or alternatives will be ranked according to their potential for life-cycle (25-year) cost reduction and the potential for acceptance by GDOT, Engineering Designers, and other appropriate parties.

TUESDAY

0800 - 1700 **Development Phase** V.E. Team

During the development phase, each team member will gather information and prepare written proposals for those ideas assigned to him/her. These may require additional discussions with the designer, GDOT representatives, outside contractors and suppliers, and other specialists to fully define the alternative. The team members will prepare sketches, perform calculations and develop other data to support each proposal. In addition, each team member will prepare estimates of costs for each alternative as originally designed, and as proposed by the V.E. team.

WEDNESDAY

0800 - 1200 **Development Phase** V.E. Team

1200 - 1300 Lunch

1300 - 1700 **Development Phase & Quality Review** V.E. Team

THURSDAY

0800 – 0900 **Prepare for Presentation** V.E. Team

0900 – 1000 **V.E. Presentation** V.E. Team Members, Design Team & GDOT Reps

The Value Engineering Team will present the proposals developed in the course of the study to the design team representatives and any participating stakeholders. The intent of the presentation is to give a clear understanding of the basis of the proposals rather than to reach a conclusion as to their acceptability. A summary table of results will be distributed at the presentation. The formal V.E. Reports will be issued within 8 business days of the workshop conclusion.

1000 – 1200 **V.E. Team Wrap-up & Final QC/QA** V.E. Team Members only

The Value Engineering Team will have a wrap-up session consisting of a final review of proposals to ensure consistency and clarity of content.